

CLAIMS

1. A method of establishing a blasting system in which a plurality of detonators are connected in a predetermined sequence which includes the step of indicating at least one location in the sequence whereby at least a first detonator in the sequence is distinguished from at least a second detonator in the sequence.
2. A method according to claim 1 wherein the at least one location is indicated by providing a marker at the location.
3. A method according to claim 2 which includes the step of interrogating the marker to establish information associated with the marker.
4. A method according to claim 3 wherein the marker is interrogated from a remote point.
5. A method according to claim 3 or 4 wherein the information relates at least to one or more of the following:
 - a) the identity of the marker;
 - b) a class or category to which the marker belongs;
 - c) the type of marker;
 - d) a timing period for a detonator;
 - e) information relating to a geological feature in an area in which the blasting system is established or used;
 - f) information relating to a configuration or pattern of the blasting system;
 - g) information relating to a designated feature in the blasting system; and
 - h) information relating to a detonator or a class of detonators.

6. A method according to claim 3,²⁵ 4 or 5 which includes the step of forming a graphical representation of at least part of the blasting system using at least part of the information which is associated with the marker.
7. A method according to any one of claims 2 to 6 wherein the detonators are connected to a harness and the marker is also connected to the harness.
8. A method according to any one of claims 2 to 7 wherein the location is selected from a physical location in an area in which the detonators are used and a notional location at which the marker is used to identify or distinguish a detonator or detonators in the sequence.
9. A method according to any one of claims 1 to 8 which includes the step of configuring the at least first detonator differently from the at least second detonator.
10. A method according to claim 9 which includes the step of initiating the at least first detonator differently from the at least second detonator or the remaining detonators.
11. A method according to claim 9 or 10 which includes the step of assigning a time delay to the at least first detonator which differs from a time delay assigned to the at least second detonator.
12. A method according to any one of claims 1 to 11 wherein the at least first detonator is distinguished from the second detonator on the basis that the first detonator is associated with a change in a physical pattern or layout in the blasting system.

13. A method according to claim 12²⁶ wherein the change in the physical pattern or layout is selected from a transition between a main line and a branch line and a boundary between one group of detonators and another group of detonators.
14. A method according to any one of claims 1 to 11 wherein the at least first detonator is distinguished from the at least second detonator on the basis that the first detonator is associated with a geological feature in rock or terrain in which the blasting system is established, or with an end of a detonator string.
15. A method according to any one of claims 1 to 14 wherein the sequence of detonators extends over at least two zones in which different types of blasting control are to be exercised and wherein the detonators in each zone are initiated in a respective manner which takes account of the characteristics in, and the requirements of, that zone.
16. A method according to claim 15 wherein each zone is demarcated, in the blasting sequence, by indicating or marking at least two locations which are spaced from each other in the detonator sequence.
17. A method according to claim 16 wherein the detonator sequence is configured so that the zones follow one another successively in a geographical sense.
18. A method according to claim 16 wherein the detonator sequence is configured so that at least one zone extends, in the form of a branch line of detonators, from a main line of detonators.
19. A method according to any one of claims 1 to 18 wherein the indicated location designates a transition in the detonator sequence wherein detonators after the

location are arranged in two or ²⁷ more zones which extend, from the location, independently of each other.

20. A marker for use in a blasting system which includes a harness, the marker including a control unit, a memory in which information is stored and a connector for connection to a selected location on the harness whereby, upon receipt of an enabling signal via the harness, the information is made available by the control unit.

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21. A marker according to claim 20 wherein the stored information relates at least to one or more of the following:

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- a) the identity of the marker;
- b) a class or category to which the marker belongs;
- c) the type of marker;
- d) a timing period for a detonator;
- e) information relating to a geological feature in an area in which the

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- blasting system is established or used;
- f) information relating to a configuration or pattern of the blasting system;
- g) information relating to a designated feature in the blasting system; and
- h) information relating to a detonator type or class.

22. A marker according to claim 21 wherein the designated feature is selected at

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least from: a position of a branch line which extends from a main line in the blasting system; a position of left and right rows which extend from a main line in the blasting system; a position at an end of a detonator string; and a position at a beginning of a detonator string.

23. A marker according to claim 20²⁸ wherein the stored information comprises a pointer to a location in an external device at which at least any of the following information is stored:

- a) the identity of the marker;
- b) a class or category to which the marker belongs;
- c) the type of marker;
- d) a timing period for a detonator;
- e) information relating to a geological feature in an area in which the blasting system is established or used;
- f) information relating to a configuration or pattern of the blasting system;
- g) information relating to a designated feature in the blasting system; and
- h) information relating to a detonator type or class.

24. A marker according to claim 20 wherein the designated feature is selected at least from: a position of a branch line which extends from a main line in the blasting system; a position of left and right rows which extend from a main line in the blasting system; a position at an end of a detonator string; and a position at a beginning of a detonator string.

25. A marker according to claim 23 wherein the pointer is selected from the following: a code which specifies blast information; and a code which designates an address at which blast information is to be accessed.

26. A marker according to claim 20 wherein the stored information comprises a prompt to initiate a decision, relating to the blasting system, from an operator, a blast controller or a programming device.

27. Marking apparatus for use in a ²⁹ blasting system which includes a housing and a plurality of markers in or on the housing, each marker being according to any one of claims 20 to 26, and a plurality of connectors which are electrically connected to one another and to the markers.

5 28. Marking apparatus according to claim 27 wherein the housing includes signage or indicators to designate the functions of the respective connectors.

29. A branch controller which comprises marking apparatus according to claim 27 or 28 which includes first and second markers which respectively designate a start and an end of a branch line which incorporates at least one detonator, a first connector for connection to an incoming line, a second connector for connection to an outgoing line, a third connector for connection to the branch line, and means for effecting electrical connections between designated conductors in the respective lines, the markers and the connectors.

10 30. A row controller for use in a blasting system which comprises marking apparatus according to claim 27 or 28 which includes first, second and third markers arranged so that the first and second markers respectively designate a start and an end of a first line which incorporates a first row of detonators, and so that the second and third markers designate a start and an end of a second line which incorporates a second row of detonators, a first connector for connection to an incoming line; a second connector for connection to an outgoing line, a third connector for connection to the first line; a fourth connector for connection to the second line; and means for effecting electrical connections between designated conductors in the respective lines, the markers and the connectors.

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31. A blasting system which includes a plurality of detonators which are connected in a predetermined sequence and at least one marker, at a defined location in the sequence, which enables at least a first detonator in the sequence to be distinguished from at least a second detonator in the sequence.

5 32. A blasting system according to claim 31 wherein the marker is according to any one of claims 20 to 26.

33. A blasting system according to claim 32 which includes at least two of the markers which respectively define opposed boundaries, in a blasting sense, of a zone.

10 34. A blasting system according to claim 33 wherein adjacent zones are separated from each other, in a blasting sense, by respective blast markers.

35. A blasting system according to any one of claims 31 to 34 wherein at least some of the detonators are configured in the form of a main line of detonators with at least one branch line of detonators which extends from the main line of detonators, and at least one respective marker which is positioned at a junction between the main line and each respective branch line.

15 36. A blasting system according to any one of claims 31 to 35 wherein at least some of the detonators are configured so that the detonators extend from a marker connected to a main line in a plurality of lines with each line of detonators extending over a defined zone.

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37. A blasting system according to ³¹claim 31 which includes at least one branch controller according to claim 29 connected to distinguish a branch line of detonators from the remaining detonators.

5 38. A blasting system according to claim 31 or 37 which includes at least one row controller according to claim 30 connected to distinguish first and second rows of detonators from the remaining detonators.

10 39. A blasting system according to any one of claims 31 to 38 which includes a display, which is responsive to the at least one marker, for displaying a graphical representation of the detonator sequence.

15 40. A method of forming a graphical representation of a plurality of detonators which are connected in a predetermined sequence which includes the steps of associating a plurality of markers with respective predetermined attributes in the sequence or with respective features in an area in which the sequence is established, connecting the markers to respective locations in the sequence, interrogating the respective markers to ascertain information relating at least to the respective associated attributes, and processing at least part of the information to generate the graphical representation.